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Patentanmeldung Nr. Patent application No. Demande de brevet n°

02078129.0

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
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**Blatt 2 der Bescheinigung
Sheet 2 of the certificate
Page 2 de l'attestation**

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Koninklijke Philips Electronics N.V.
5621 BA Eindhoven
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Utensil and use of a sol gel coating on such an utensil

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Utensil and use of a sol gel coating on such an utensil

EPO - DG 1

30. 07. 2002

(43)

The invention relates to a utensil which is provided with a sol gel coating comprising an organosilane compound. The invention also relates to the use of such a sol gel coating on an utensil.

5

As the chemical resistance of sol gel based coatings is superior to regular decorative coatings based on organic material, sol gel coatings are commonly very well suited to serve as coatings that are exposed to cosmetic formulations, such as lotions and shampoos. For example, in WO 98/13434 such a sol gel coating is described, wherein said
10 sol gel coating contains a network of a hydrolytically condensed organosilane compound.

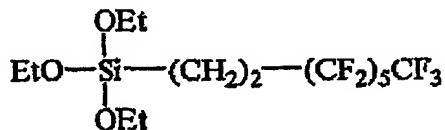
The surface tension of such coatings varies between 30 and 50 mN/m. Application of liquids, like cosmetic formulations in personal care appliances, will commonly lead to easy spreading of the liquid on the coated surfaces when the surface tension of the liquid is lower than the surface tension of the surface. Such adhesive spreading
15 leads to relative difficult cleaning especially when the personal care appliance is not cleaned immediately after use. Difficulties with cleaning said appliances is from a hygienic, aesthetic and practical point of view undesired. When the surface tension of the liquid is higher than the surface tension of the surface of an appliance no spreading of the liquid will take place and easy cleaning will be possible.

20 The surface tension of cosmetic formulations can highly vary depending on the ingredients used. In particular the attendance of surfactants is commonly very defining for the surface tension of the cosmetic formulation. When surfactants are used, surface tensions as low as 20-22 mN/m can be achieved. It is therefore obvious that such liquids will spread easily on materials, such as coatings and plastics normally applied within utensils for
25 personal care.

It is an object of the invention to provide a utensil provided with an improved sol gel coating that prevents easy spreading of a liquid.

This object is achieved by an utensil as mentioned in the opening paragraph characterized in that the organosilane compound is fluorinated, such that the bonded fluor is non-hydrolyzable. Application of such a fluorinated organosilane compound according to the invention leads to a sol gel coating with a low surface tension (approximately between 20-21 Nm/m), which results in a relatively strong hydrophobic character. As a result the sol gel coating is relatively easy to clean by simple rinsing under e.g. tap water. As utensils according to the invention can for example be remarked containers for liquids, such as shampoo, lotions and perfumes, but also other appliances which are adapted for lotions and/or (cleaning with) water, like electric, wet shaving appliances (e.g. the Philip's Coolskin®).

The fluorinated organosilane compound contains preferably at least one fluorinated alkyl group. The fluorinated alkyl group is thereby provided with one or more nonhydrolyzable fluor atoms. The length and spatial construction of the alkyl group is not restricted to a single embodiment, but can vary considerably. Preferably, tridecafluoro, 1,1,2,2,tetrahydrooctyltriethoxysilane is used within a sol gel coating according to the invention. Tridecafluoro, 1,1,2,2,tetrahydrooctyltriethoxysilane can be visualized in the following chemical structure:



The ethoxy groups are hydrolyzable, resulting in alcohol and a reactive intermediate that can easily be condensed with other silanes forming Si-O-Si bonds. The resulting network has a high resistance to a great variety of compositions such as e.g. lotions for personal care, is highly hydrophobic and easy to clean. Although all kind of fluorinated substances in principle can achieve the object of the invention preferably a fluorinated organosilane compound is applied containing at least one alkoxy group. In this way the fluorinated compound is build into the network preventing leaching out of the fluorinated compound. Incorporation of fluorinated compounds into regular organic lacquers will also result in a high hydrophobic character but such coatings lack the chemical and mechanical resistance of sol gel based coatings.

The invention also relates to the use of a coating with a fluorinated organosilane compound on a utensil.

The invention is further illustrated in the following non-restrictive examples.

Example 1

To a mixture of 19.8 gram 3-glycidyloxypropyltrimethoxysilane, 8.6 gram tetraethoxysilane, 1.5 gram tridecafluoro-1,1,2,2 tetra hydro-octyl triethoxysilane and 27 gram ethanol was added 0.6 gram maleic acid. After dissolution of the acid 44 gram Ludox AS-40 (40% silica dispersion, DuPont) was added under stirring. After 45 minutes a mixture of 10.3 gram $\text{Zr}(\text{OPr})_4$ (70% in propanol) and 2.2 gram ethylacetoacetate was added. The resulting lacquer was sprayed on a nylon substrate and cured at 160 °C for 20 minutes. The surface tension turned out to be 20.6 mN/m.

Example 2

In a comparative example no fluorinated silane was used resulting in a surface with a surface tension of 42 mN/m.

Rinsing the coating with acetone (23.7 mN/m) or ethanol (22.3 mN/m) giving poor wetting in both cases can easily visualize the low surface tension of the fluorinated sample. In case of the non-fluorinated sample perfect wetting takes place.

Coated samples were covered with shaving emulsion (see e.g. Philips' Cool Skin) and dried in the air for one week. The semisolid residue could easily be removed by rinsing with tap water in the case of the fluorinated sample. In the comparative non-fluorinated sample, cleaning was difficult and required hot tap water for prolonged times.

CLAIMS:

30. 07. 2002

(43)

1. Utensil, which is at least partly provided with a sol gel coating comprising an organosilane compound, characterized in that the organosilane compound is fluorinated, such that the bonded fluor is non-hydrolyzable.

5 2. Utensil as claimed in claim 1, characterized in that the fluorinated organosilane compound contains at least one fluorinated alkyl group.

3. Utensil as claimed in one of the foregoing claims, characterized in that the organosilane compound contains at least one alkoxy group.

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4. Utensil according to one or more of claims 1-3, characterized in that it comprises an electric shaver.

15 5. Use of a coating with a fluorinated organosilane compound on a utensil as claimed in one the claims 1-4.

ABSTRACT:

30. 07. 2002

(43)

As the chemical resistance of sol gel based coatings is superior to regular decorative coatings based on organic material, sol gel coatings are commonly very well suited to serve as coatings that are exposed to cosmetic formulations, such as lotions and shampoos. The invention relates to an utensil which is provided with a sol gel coating

5 comprising an organosilane compound that has been fluorinated. The invention also relates to the use of such a sol gel coating on an utensil.